ABSTRACT

Multiple-component solid compositions including at least two intermingled, different solid oxides or hydroxides are provided which have extremely small crystallite sizes (at least one of the materials exhibits a crystallite size of about zero to 4 nm) and large surface areas. The compositions comprise at least two molecularly intermingled nanocrystalline materials selected from the group consisting of the oxides and hydroxides of the elements of Groups IIA, IIIA, IVA, the transition metals and the lanthanide series of the Periodic Table. The compositions are synthesized by separately preparing alkoxide solutions which are then mixed and hydrolyzed to give a gel; the gel is then treated to yield the desired hydroxide or oxide final composition. The compositions are useful for sorption of target materials such as undesireable compounds or biological materials. Extremely high surface area aluminum oxides having BET surface areas of at least about 700 m^2/g are also disclosed.